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ABSTRACT

The Eisenhower Pre-Service Teacher Education Project was developed by the University of Central Florida, the five community colleges in Region III of the Higher Education Consortium, and the private college and universities in the same region to design curriculum changes to improve the preparation of elementary and secondary math and science teachers. Faculty members at participating institutions developed projects designed to both improve the math and science content knowledge of pre-service teachers, as well as teaching methods in undergraduate math and science courses. Funded projects included the following: (1) the introduction of "hands-on" activities into college Astronomy and Oceanography courses; (2) the identification of potential K-12 pre-service teachers during their freshman and sophomore years to improve their math and science backgrounds; (3) the development of a field study guide for a college arboretum; (4) regional meetings of two-year college physics teachers to increase communication; (5) the implementation of a professional development speaker series of workshops and discussions focusing on teaching strategies; (6) the development of a statistics activity to let student teachers collect and analyze data from local elementary schools; and (7) an effort to provide methods training to four mathematics majors and allow them to teach classes at local high schools. A sample project and end-of-project evaluation are included. (HAA)

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ED 399 981

Final Report: Eisenhower Pre-Service Teacher Education Project, Higher Education Consortium Region III

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JC 960 570

FINAL REPORT
EISENHOWER PRE-SERVICE TEACHER EDUCATION PROJECT
HIGHER EDUCATION CONSORTIUM
REGION III

Abstract

This project was developed to improve the preparation of teachers of mathematics and science for all levels of public schooling, K-12. Faculty members from the University of Central Florida, the five community colleges in Region III of the Higher Education Consortium (HEC), and the private college and universities in the same region with teacher preparation programs engaged in strategic planning activities to plan an approach to curriculum change that will improve the preparation of teachers. Emphasis was placed on improving the preparation in mathematics and science of elementary school teachers. However, the preparation of secondary teachers was considered as well. New courses were developed and old courses were improved to model good pedagogy throughout the mathematics and science curriculum. Also, opportunities were developed to allow pre-service teachers to work with master teachers who model excellence in teaching.

Participants

Region III of the Higher Education Consortium includes the following institutions: The University of Central Florida, Rollins College, Brevard Community College, Valencia Community College, Seminole Community College, Daytona Beach Community College, Central Florida Community College, Lake-Sumter Community College, Bethune Cookman College, Florida Institute of Technology, Embry Riddle University, and Stetson University. These institutions each had a representative on the steering committee of the Pre-Service Teacher Education Project supported by Eisenhower funds.

Activities

Minigrants

Faculty members at the participating institutions were given the opportunity to submit a proposal for projects aimed at improving the mathematics and science content knowledge of pre-service teachers as well as improving the teaching of mathematics and science at the undergraduate level by new or part-time instructors. Following is a summary of each funded project:

- Development of Hands-On Activities for General Education Earth Science Courses.

  This project added nine "hands-on" activities to be used in place of lecture in both Introduction to Astronomy and Introduction to Oceanography. All instructors at Seminole Community College are required to use a minimum of one activity every two weeks. Students do the activities in groups of three. They take approximately one hour to complete.

  These labs were presented at the Florida Academy of Science in Spring 1996 and also at the 7th Annual Conference on College Teaching and Learning in March. See sample labs in Appendix I.

- Learning by Teaching

  The University of Central Florida in collaboration with Brevard Community College, Valencia Community College, and Daytona Beach Community College attempted to identify and attract potential K-12 pre-service teachers during their freshman and sophomore years in order to promote strong backgrounds in mathematics and science.

  This task was accomplished in three ways. First, students were given service learning opportunities in mathematics and science

classes to tutor in local centers and schools in order to get a "taste" of the teaching field. This opportunity forced students to analyze and synthesize what they have learned in order to present the material. Second, training sessions were held for community college mathematics and science teachers in order to assist them with using technology, effective assessment techniques, and experiential teaching strategies. Training was done in order to develop teacher role models at the community college while making community college mathematics and science classrooms more enticing, thus enhancing teaching as a possible future career choice. Finally, pre-service teachers will get multiple opportunities to utilize technology for relevant problem solving exercises in order to instill the desire to become lifelong learners of new technology and its classroom applications.

A training manual in service learning for mathematics and science was developed and distributed at the National Campus Compact meeting in Scottsdale, Arizona, as well as presented at the statewide Campus Compact meeting in Boca Raton, Florida. Some results of this project were published in Academic Abstracts and Dimensions in Mathematics. The results are also available through the HECIII homepage.

- Field Study Guide (Plants and Animals in the SCC Arboretum)

  A guide book was developed which contains information on designated plants and animals at the Seminole Community College Arboretum. The plants are numbered so that teachers or students can follow the self study guide directly or adapt it for use specific to their goals. Information includes common and scientific names, drawings and pictures of plants, general descriptions including size, edible/nonedible, poisonous, use, and wildlife significance. Also included is a "how to identify guide" and multi-cultural notes of interest regarding these plants.

  This guide has been distributed to all of the local K-12 schools. Copies are available for each school in HEC Region III. The guide is also available to the public for $2.50 at the Seminole Community College bookstore.

- The Two-Year College in the Twenty-First Century: Breaking Down Barriers (TYC21).

  Region III supported participation by HEC members in two meetings for physics teachers in the two year colleges. There was funding set aside for one Fall and one Spring meeting. Support was also given for speakers and panelists at these meetings. These meetings increased the communication between physics teachers

within Region III as well as increasing communication between physics teachers throughout the state.

- Professional Development Speaker Series

The "Professional Development Speaker Series" enabled HEC and the Christian A. Johnson Institute for Effective Teaching at Rollins college to bring in three speakers to assist in faculty development. Participants in all of these workshops and discussions gained a better understanding of teaching strategies that enhance student learning in science and mathematics.

Marlene Johnshoy, University of Minnesota, presented a series of workshops on the effective use of the Internet and computer technology in teaching college courses. One session was a specific introduction to Internet resources in science and mathematics for HEC members. This was attended by 16 HEC members from a variety of Central Florida institutions. HEC members also participated in a day-long workshop on "Creating your own web page" and in a colloquium on the pros and cons of the use of technology in the classroom.

Joe Novak, Cornell University, spoke at Central Florida Community College, Rollins College, and the University of Central Florida. Thirty-four HEC members from four institutions attended

Novak's presentation on concept mapping at CFCC. His discussion with faculty, and presentations to students and faculty at both Rollins and UCF were very well attended. His talk on the basics of concept mapping presented at UCF was videotaped and a copy of the tape was given to all institutions of higher education in Region III.

Lillian Bridwell-Bowles, University of Minnesota-Twin Cities, presented a talk entitled "Writing to Learn Science and Mathematics", to 29 HEC members from six different colleges and universities. This session was held at Valencia Community College.

- Computers and Cooperative Learning in Statistics

A statistics activity manual was developed that has students analyze data from local elementary and secondary schools on the computer. Collecting the data gives the students the opportunity to explore the teaching field while learning more about educational research.

By incorporating cooperative learning and computers into the course, students will become active rather than passive learners. At the same time, students will become more aware of education related issues because education related issues can be used as the basis for real life data analysis.

- Opportunity for math/science students to discover teaching as an option

This project gave four students majoring in mathematics or the sciences the opportunity to try teaching something in local high schools in order to help them see whether this might be a profession they would like to pursue. In addition, six faculty members from the department of mathematics in the College of Arts and Sciences participated in the program at some level.

The students took a methods course created and taught for this project by Professor Douglas Brumbaugh. The class met two evenings a week for one and one-half hours until March 15, 1996. Each student participant was paired with a teacher in a local high school who had agreed to work with the student participant and to allow the student to teach one class. After visiting the teacher in the class, each student prepared and taught a topic of interest that fit into the curriculum of the visited class. Professor Brumbaugh and the faculty participants were available to go over lesson plans and to observe practice sessions prior to the student participants actually teaching in the high school classroom.

The only disappointing features of the project were that none of the participants was placed in an elementary school and that only

four eligible students participated. The students were identified by sending memos to professors in mathematics, science, and engineering. The memos asked them to make their students aware of the opportunity. Some interested students who were unable to participate in the program this time expressed the hope that the opportunity would be available again. Comments for project summary are in Appendix II.

- Early Identification Plan

Six professional development sessions were developed and conducted by Central Florida Community College during spring term 1996. These sessions included such topics as technology in the classroom, effective teaching strategies, equity in education, and encouraging women and minorities into mathematics and science.

These sessions were attended by a select group of community college pre-service teachers, local high school students who have demonstrated a strong background in mathematics and science, as well as six Central Florida Community College faculty members and several faculty members for other schools within HEC Region III. The sessions utilized local resources such as explorations at Silver Springs, and local educational centers.

A video highlighting these workshops was developed for future training sessions. The video includes many experts in the mathematics and science education fields.

- Effective Teaching: Those Who Can, Teach

A graduate level course in teaching science at the higher education level was developed at Florida Institute of Technology, offering 3 credits with 15 sessions. These sessions were designed to bridge the gap between expertise in a field and being an expert teacher in that field. The belief is that people trained in effective teaching techniques will be able to draw more students into scientific and mathematical disciplines, particularly those from traditionally underrepresented groups.

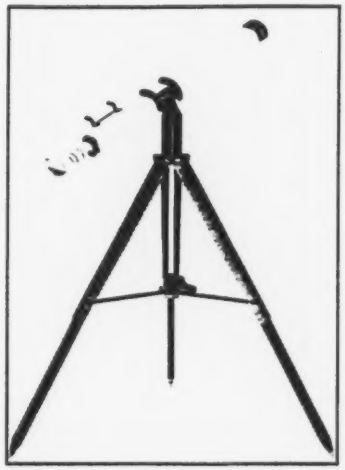
The course was attended by 14 graduate students preparing for the field of teaching in higher education. The course syllabi can be found in Appendix III.

Regional

Several other projects, in addition to the minigrants, were completed over the duration of the Eisenhower grant. These activities included the development and updating of an HEC Region

III website housed on a Pegasus account at ~heciii. Region III partially sponsored the HEC annual statewide meeting.

An outstanding communication network has developed throughout Region III as a result of this grant. Region III had the largest number of participants from any Region attend the statewide meeting for HEC as well as the 7th Annual Conference on College Teaching and Learning due to this extensive communication network.



REFRACTING TELESCOPE LAB

OVERVIEW

Understanding what is meant by focal length and its use in telescopes should prepare you for actual use of same. You should be able to determine the magnification or power of a telescope by using the formula outlined below.

PROCEDURES

1- Look through each of the lenses at things that are far away and things that close. Determine which of the lenses (the fatter one or the thinner one) provides the most magnification ?

The lens that has the most magnification will serve as the eyepiece in the telescope. Will also have the shortest focal length.

2- Place the lens in a holder on the meter stick. Note reading. Place a viewing card in a holder and move in or out until you achieve focus. Note the difference between the two holders and record as the focal length f_e .

$$f_e = _____ mm$$

3- Place the other lens in a holder and repeat step two. Record this focal length as f_o

$$f_o = _____ mm$$

4- Calculate the theoretical magnification of the telescope by dividing the focal length of the objective lens by the focal length of the eyepiece lens.

$$M = f_o/f_e = _____$$

5- Construct the telescope by placing the lenses ,in the holders, on the meter stick. space them at a distance equal to $f_e + f_o$.

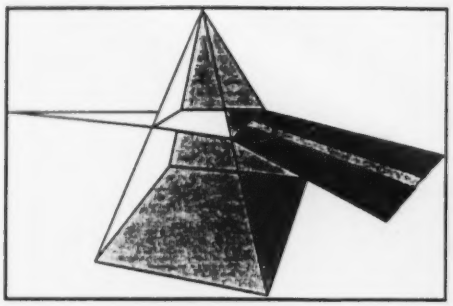
6- Hold the telescope up to the eye. Look through the eyepiece and line up the objective. It will take a little effort and concentration to look at some object such as a sign on the wall . It may be necessary to move the holders to achieve a sharp focus.

7- Did you get the telescope to work ?

8- When you looked through the telescope was the image you saw right-side-up or up-side-down ?

9. Make a comparison of the size of the image you see through the telescope with the image that you see without the telescope. Compare this with the calculated image from step #4.

SPECTROSCOPE LAB



OVERVIEW

One of the most important phases of Astronomy is the use of the spectra of a body for many purposes. It may be used for chemical content, temperature, star classification and distance. As such, using a spectrascope should give you an insight into the measurement of spectral lines.

This lab is in two parts. The first part is a written part that you will complete with assistance from your notes or text. The second part will require you to examine various gas lights with a spectroscope and identify the element present by measuring the wavelength(s).

1- Describe the three types of spectra.

a.

b.

c.

2- a. Explain what causes an object to emit a continuous spectrum.

b. What determines the wavelengths emitted from a body giving off a continuous spectrum ?

3- a. Explain what causes an object to emit a line spectrum.

b. What determines the wavelengths emitted from a body giving off a line spectrum ?

4- Explain what causes a dark line spectrum. Draw a sketch of the source, gas cloud, and the observer.

PART TWO

INSTRUCTIONS FOR USING SPECTROSCOPE

OPERATION: Look through the diffraction grating at the narrow end of the spectroscope while pointing the slit toward the light source. The spectrum should appear on the right side of the slit below the scale that shows the wave lengths. To improve visibility, cup your hand around the end at your eye to to avoid stray light.... Nver look directly at the sun.

CALIBRATION: The numbers on the scale represents measurements Angstrums and all numbers should be multiplied by 1000. Point the instrumentat a fluorescent light source. The full spectrum should be seen as well as two emission lines. The line in the green area should read 5460 A and the line in the violet area should read 4360 A. If these lines do not appear at the above wavelengths, note the difference and apply to all future readings as a constant.

PROCEDURE: Various gas lights will be exhibited for your examination. Using the spectroscope, try to determine the proper wave length(s) for each light. Be sure to apply any constant you found in step two.

From the chart below, select an element.

Sodium	5890 A
Strontium	6060 A
Lithium	6708 A
Copper	4300 A - 6300 A
Hydrogen	6530 A- 4830 A- 4310 A
Mercury	4360 A- 5460 A- 5770 A
Helium	4470 A- 4680 A- 4920 A- 5010 A- 5870 A -

1. _____
2. _____
3. _____
4. _____

APPENDIX II

END OF PROJECT REPORT

Please fill out the following information and attach your project (if product, i.e.,handbook, activities) upon its completion. Submit the completed form and project to Jacci Wozniak at ED146 College of Education, University of Central Florida, Orlando, FL 32816-1250.

Project Summary and Accomplishments:

Four students in mathematics or the sciences were able to try teaching to see if they would like to do that as a profession. Professor Brumbaugh from mathematics education, twice weekly, led a discussion about teaching among the four student participants and six college of arts and sciences, mathematics faculty. All came away with much that will affect their lives in positive ways.

Describe how this project has changed the way you teach.

I have always tried to have a dialogue with my students during class rather than just sticking to the lecture mode. However, in the past whenever I received a correct response, unless I observed puzzled looks, I was prone to moving on. I am now trying to make sure that the class as a whole has had time to absorb and understand before moving on. I am trying to find new ways, compatible with my personality, to raise doubts in students' minds to make sure they are thinking instead of merely swallowing and regurgitating. It was a pleasure to have some positive reinforcement for some things that I have apparently been doing well.

What ideas can you share with your colleagues?

I can urge them to participate in another such program should the opportunity arise.

How will students be affected by this project?

UCF students will have some teachers who, hopefully, will be able to make some helpful changes in their classroom teaching. The student participants have had opportunity to hear legitimate concerns and helpful perspectives from both the educator and the discipline sides of the fence. Their own experiences as students and future teachers cannot help but be enhanced.

What impact do you believe new teaching strategies and/or technology has had in your classroom?

The impact will, hopefully, be progressive. I have developed habits over a lifetime that can only be changed gradually and with considerable effort and patience.

Howard Sherwood

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END OF PROJECT REPORT

Please fill out the following information and attach your project (if product, i.e.,handbook, activities) upon its completion. Submit the completed form and project to Jacci Wozniak at ED146 College of Education, University of Central Florida, Orlando, FL 32816-1250.

Project Summary and Accomplishments:

Enjoyed it – Try Again

Describe how this project has changed the way you teach.

Doug gave me a form to use on the Faculty

What ideas can you share with your colleagues?

Lot's often Faculty Evaluations

How will students be affected by this project?

They won't forget the Faculty.

What impact do you believe new teaching strategies and/or technology has had in your classroom?

Don't know yet

JRC

Martin Weinzierl

END OF PROJECT REPORT

Please fill out the following information and attach your project (if product, i.e.,handbook, activities) upon its completion. Submit the completed form and project to Jacci Wozniak at ED146 College of Education, University of Central Florida, Orlando, FL 32816-1250.

Project Summary and Accomplishments:

1. Gave some non-math education majors with some interest in teaching the opportunity to become better acquainted with several aspects of the teaching profession.
2. Gave several members of the mathematics faculty the opportunity to learn about how the College of Ed. tries to prepare students to teach in the K-12 area.

Describe how this project has changed the way you teach.

Probably hasn't made any real change yet - it has made me more conscious of how I teach and of the fact that I need to work harder on getting the students involved in my classes - this is not easy for me to do.

What ideas can you share with your colleagues?

1. The Ed. College has a very difficult job in trying to prepare our teachers.
2. I have more respect for their efforts and problems than before.

How will students be affected by this project?

1. UCF students should benefit from improved teaching by the faculty involved in the course.
2. The students in this project may choose their life's work based on their experiences in the course.
3. Hopefully society will get some good teachers it may not have gotten because of this course.

What impact do you believe new teaching strategies and/or technology has had in your classroom?

Not much impact now - but I hope to improve my teaching by using some of Dr Brumbaugh's teaching strategies.

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Mathematics Department

ROOM 403 PHILLIPS HALL, (893-2493)

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To: Jacci Wozniak

From: Pete Rautenstrauch, Associate Professor and Assistant Chair C.P.R.

Date: 4/26/96

Subject: Teaching with Anthony, Brumbaugh, and Sherwood

I sat in on this class twice in the term. I found it quite stimulating as I was able to partake in a discussion of pedagogical matters in an open and active way that is not the norm in our usual routine. The interchange of ideas among the faculty and students in an atmosphere of equality and collegiality was refreshing and exciting. I take as axiomatic that changes in strategies or technologies are desirable and my participation was limited. Therefore I am not completing the original form I was given. Nevertheless, I found my two experiences rewarding and would encourage anyone to participate whatever there views might be. I hope that the opportunity for such open and active discussions can continue to be made available to both faculty and students.